

What is claimed:

1 1. A method of operating an apparatus to scale soft input values obtained, from a signal  
2 transmitted through a communications channel, as part of a decoding process, the method  
3 comprising:

4 computing a current scaling factor as a function of a preselected channel quality value  
5 and at least one of said soft values, said preselected channel quality value being independent of  
6 actual channel conditions at the time said signal was transmitted; and

7 scaling one of said soft values using said computed current scaling factor to produce a  
8 scaled soft value.

1 2. The method of claim 1, wherein a plurality of soft value distributions are possible, a  
2 subset of possible soft value distributions corresponding to said preselected channel quality  
3 value while other possible distributions correspond to other channel quality values, said step of  
4 computing a current scaling factor including:

5 determining a scaling factor which, when applied to said received soft values, produces a  
6 soft value distribution in said subset of soft value distributions corresponding to said preselected  
7 channel quality value.

1 3. The method of claim 2, wherein determining a scaling factor includes:

2 computing from at least some of said soft input values a plurality of channel quality  
3 values, each channel quality value corresponding to a different scale factor.

1 4. The method of claim 3, further comprising:

2 interpolating between at least two of said plurality of channel quality values to produce  
3 an interpolated value; and

4 determining said current scale factor as a function of the interpolated quality value.

1 5. The method of claim 1, wherein said preselected channel quality value is a channel  
2 capacity value.

1 6. The method of claim 3, wherein computing said scaling factor includes;  
2 determining a current channel quality function from a first scale factor.

1 7. The method of claim 6, further comprising:  
2 solving said function to determine a scale factor which, when applied to said function  
3 given said at least some soft input values, produces said target channel quality, said determined  
4 scale factor being used as said current scale factor.

1 8. The method of claim 2, wherein determining the current scale factor is part of a iterative  
2 process that includes:  
3 updating the current scale factor as a function of a soft value scaled by the current scale  
4 factor being updated.

1 9. The method of claim 8, wherein said updating includes:  
2 comparing a channel quality value corresponding to the scaled soft value to the target  
3 quality value to determine a difference between the target quality value and the corresponding  
4 quality value; and  
5 adjusting the scaling factor as a function of said determined difference.

1 10. The method of claim 9, wherein said scale factor is adjusted in a direction which reduces  
2 subsequent differences between the channel quality value corresponding to a subsequently  
3 processed soft value and said target channel quality value.

1 11. The method of claim 9, wherein scale factor adjustments are made within a range  
2 extending between a maximum permitted scaling value and a minimum permitted scaling value,  
3 individual scale factor adjustments being no larger than a maximum adjustment step size of 2%  
4 of the maximum permitted scaling value.

1 12. The method of claim 1, wherein said preselected channel quality value is a value  
2 corresponding to a quality region that is within but near the edge of an acceptable channel  
3 quality region

1 13. The method of claim 1, wherein said decoding process includes at least one of a low  
2 density parity check decoding operation and a turbo code decoding operation.

1 14. An apparatus for determining a factor to be used to scale soft input values obtained, from  
2 a signal transmitted through a communications channel, comprising:  
3 a receiver for receiving a signal transmitted through a communications channel;  
4 means for generating soft input values from said received signal;  
5 memory for storing a preselected channel quality value, said preselected channel quality  
6 value being independent of actual channel conditions at the time said signal was transmitted; and  
7 means for computing a scaling factor as a function of said preselected channel quality  
8 value and at least one of soft input values.

1 15. The apparatus of claim 14, wherein said preselected channel quality value is a value  
2 corresponding to a quality region that is near the edge of an acceptable channel quality region.

1 16. The apparatus of claim 15, wherein said preselected channel quality value is a channel  
2 capacity value.

1 17. The apparatus of claim 14, wherein a plurality of soft value distributions are possible, a  
2 subset of possible soft value distributions corresponding to said preselected channel quality  
3 value while other possible distributions correspond to other channel quality values, said means  
4 for computing a scaling factor including:

5 means for determining a scaling factor which, when applied to said received soft values,  
6 produces a soft value distribution in said subset of soft value distributions corresponding to said  
7 preselected channel quality value.

1 18. The apparatus of claim 17, wherein said means for determining a scaling factor includes:  
2 means for computing from at least some of said soft input values a plurality of channel  
3 quality values, each channel quality value corresponding to a different scale factor.

1 19. The apparatus of claim 18, further comprising:  
2 means for interpolating between at least two of said plurality of channel quality values to  
3 produce an interpolated value; and  
4 means for determining said scale factor as a function of the interpolated quality value.

1 20. The apparatus of claim 19, wherein said means for computing and means for  
2 interpolating each include computer instructions for controlling a processor to implement at least  
3 a portion of said computing and interpolating operations.

1 21. The apparatus of claim 18, wherein said means for computing said scaling factor  
2 includes:

3 means for determining a channel quality function from a first scale factor; and  
4 means for solving said function to determine a scale factor which, when applied to said  
5 function given said at least some soft input values, produces said target channel quality, said  
6 determined scale factor being used as said current scale factor.

1 22. The apparatus of claim 17, wherein said means for determining the current scale factor  
2 performs an interactive process, said apparatus further including:  
3 a control loop for updating the current scale factor as a function of a soft value scaled by  
4 the current scale factor being updated.

1 23. The apparatus of claim 22, wherein said control loop includes:  
2 a comparator for comparing a channel quality value corresponding to the scaled soft  
3 value to the target quality value to determine a difference between the target quality value and  
4 the corresponding quality value; and  
5 means for adjusting the scaling factor as a function of said determined difference.

1 24. A machine readable medium comprising;  
2 machine executable instructions for controlling a machine to perform the steps of:  
3 i) computing a current scaling factor as a function of a preselected channel  
4 quality value and at least one soft input value obtained, from a signal transmitted  
5 through a communications channel, said preselected channel quality value being  
6 independent of actual channel conditions at the time said signal was transmitted;  
7 and  
8 ii) scaling said at least one said soft value using said computed current scaling  
9 factor to produce a scaled soft value.

- 1 25. The machine readable medium of claim 1, further comprising:
  - 2 said preselected channel quality value, said preselected channel quality value being a
  - 3 value corresponding to a quality region that is near the edge of an acceptable channel quality
  - 4 region.
  
- 1 26. The machine readable medium of claim 25, wherein said channel quality value is a
- 2 communications channel capacity value.